



ROOF REPLACEMENT

Headquarters Office Building

Project Number 1210776

Chaparral Wildlife Management Area

64 Chaparral WMA Dr., Cotulla, TX 78014

TECHNICAL SPECIFICATIONS STANDING-SEAM METAL ROOF



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SPECIFICATIONS

SECTION 074113 - STANDING-SEAM METAL ROOF

PART 1 - GENERAL

1.1 SUMMARY

- A. Location: **Chaparral Headquarters Office Building Roof Replacement** project, located at: Chaparral WMA, 64 Chaparral WMA Dr., Cotulla, TX 78014.
- B. Scope: This technical specification section includes **structural standing seam metal roof** system.
- C. Furnish all labor, material, tools, equipment, services, and incidentals necessary to remove the existing roof and to install new structural standing-seam metal roof system. Work shall include:
 - 1. Removal of the existing roof material down to the existing wood purlins (1x4 wood horizontal lathing). Salvage existing roof corrugated metal panels for Owner's future use.
 - 2. Replace rotted or damaged wood, purlins, fascia and/or trim. For bidding purposes, assume 10% replacement.
 - 3. Install 30# felt underlayment as moisture barrier/vapor retarder.
 - 4. Install all new metal roof panels, panel clips, flashing, trim, fascias, roof ridge vent, drip edges and other metals, sealants, fillers, and any other required items.
 - 5. Install new-gutters, downspouts, and splash pans.
 - 6. Install new ridge vents with necessary flashings and sealants.
 - 7. Prime and paint (2 coats) any new and/or replaced exposed wood trim fascia to match existing. Exterior 'brown' paint color is Sherwin-Williams 'Status Bronze' #7034 or color to match.
 - 8. Uninstall and re-install structural support cables that tether the communication tower directly to the roof structure. Use lag eye-screws as anchors to roof structure. Add temporary tethers as required for continuous support.
- D. Electricity will be furnished by the Owner, but Contractor should be prepared to provide own power if necessary and shall not be a circumstance for additional costs. Contractor should bring their own electrical plugs and extension cords. Water and Restroom facilities are not available on site to Contractor.
- E. Highly Recommended Site Visit: Bidders and Contractors should visit site to take measurements and verify scope of work prior to bidding project. Prospective Contractor is responsible for verifying existing materials, quantities of new materials, and scope of work before submitting their proposal.

1.2 PRE-INSTALLATION MEETING

- A. Preinstallation Conference: After the project has been awarded, conduct conference at project site: Chaparral Headquarters Office Building located at: South Texas Ecosystem Project Office, 64 Chaparral WMA Dr., Cotulla, TX 78014.
1. Meet with Owner's Representatives: Architect (Design Manager), and Construction Manager. Meet with Contractor and with contractor's project manager, superintendent, and foreman; and metal panel manufacturer's representative, and installers whose work interfaces with or affects metal panels, including installers of roof accessories and roof-mounted equipment.
 2. Review and finalize construction schedule and verify availability of materials, Installer's personnel, equipment, and facilities and lay-down areas needed to make progress and avoid delays.
 3. Review methods and procedures related to metal panel installation, including manufacturer's written instructions.
 4. Examine support conditions for compliance requirements, including alignment between and attachment to structural members.
 5. Review structural loading limitations of existing purlins and rafters, before and after roofing installation.
 6. Review flashings, special details, drainage, penetrations, and conditions of other construction that affect metal panels.
 7. Review governing regulations and requirements for insurance, certificates, and tests and inspections where applicable.
 8. Review temporary protection requirements for roof and structure during demo and installation of new roof and metal panel systems before and after installation.
 9. Review procedures for repair of metal panels damaged, if any, after installation, and all warranty provisions.
 10. Document proceedings, including corrective measures and actions required, and furnish copy of meeting record to Owner's Representative and Architect.
- B. Commencement of work by the Contractor shall constitute acknowledgement by the Contractor that this specification can be satisfactorily executed, under the project conditions and with all necessary prerequisites for warranty acceptance by roofing system manufacturer.

1.3 ACTION SUBMITTALS

- A. Qualification Data: For Metal Panel Roof Manufacturer's Qualifications.
- B. Product Data: General Product Data, including manufacturer's product specifications, product catalog, installation instructions, and general recommendations applicable to materials and finishes for each component and for total system of metal panels, including but not limited to manufacturer's specifications on all sealants, fasteners, and required sub-structural connections.
1. Include from the manufacturer typical material and construction descriptions, dimensions of individual components and profiles, and finishes for the panel type and its accessories.

2. Include similar samples of roof trim and accessories, of gutters and downspouts, involving similar color selections, for approval by Owner and Architect.
- C. Material Samples for Verification: For type of exposed finish required, with sample size indicated below.
1. Metal Panel Sample: 12-inches long by 16-inches actual panel width. Include clips, fasteners, closures, and other metal panel accessories.
 2. Gutter and Downspout Sample: Include color samples to Owner and Architect.
 3. Provide actual material samples to Owner and Architect for approval before materials are ordered.
- D. Product Test Reports: For each product, indicating compliance of projects with requirements.
- E. Test and Inspection Reports: For the metal roof panel installation, including accessories. Report results in writing, to determine compliance of replaced and/or additional work within specified requirements.

1.4 QUALITY ASSURANCE

- A. Metal Panel Roof Manufacturer's Qualifications: Minimum five years of experience in manufacture of similar products in successful use in similar applications.
- B. Roofing Installer Minimum Qualifications and Experience: An entity that employs installers and supervisors who are trained and approved by manufacturer.
- C. Provide factory fabricated and finished metal panels and accessories meeting performance and structural requirements. Fabricate metal panel joints configured to accept factory-applied sealant providing weathertight seal and preventing metal-to-metal contact and minimizing noise resulting from thermal movement. Provide on-site Portable Roll-Forming Equipment capable of seaming metal panels as warranted by manufacturer.

1.5 DELIVERY, STORAGE, AND HANDLING

- A. Deliver components, metal panels, and other manufactured items so as not to be damaged or deformed. Package metal panels for protection during transportation and handling.
- B. Unload, store, and erect metal panels in a manner to prevent bending, warping, twisting, and surface damage.
- C. Stack metal panels horizontally on platforms or pallets, covered with suitable weathertight and ventilated covering. Store metal panels to ensure dryness, with positive slope for drainage of water. Do not store metal panels in contact with other materials that might cause staining, denting, or other surface damage.
- D. Retain strippable protective covering on metal panels during installation.

1.6 FIELD CONDITIONS

- A. Field verify existing roofing system. As indicated in photos in the Appendix, the existing roof is corrugated metal panels on wood purlins on wood trusses.
- B. Coordinate with Owner to shut down air-intake equipment in the vicinity of the Work. Cover air-intake louvers before proceeding with reroofing work that could affect indoor air quality or activate smoke detectors in the ductwork.
- C. Uninstall and re-install structural support cables that tether the communication tower. Add temporary tethers as required for continuous support.
- D. Owner may occupy portions of the building immediately below reroofing area. Conduct reroofing so Owner's operations are not disrupted. Provide Owner with not less than 72 hours' notice of activities that may affect Owner's operations.
 - 1. Coordinate work activities daily with Owner so Owner can place protective place protective dust and water-leakage covers over sensitive equipment and furnishings, shut down HVAC and fire-alarm or -detection equipment if needed, and evacuate occupants from below work area.
 - 2. Before working over structurally impaired areas, notify Owner to immediately evacuate occupants from below affected area. Verify that occupants below work area have been evacuated before proceeding with work over impaired area.
- E. Protect building to be reroofed, adjacent buildings, walkways, site improvements, exterior plantings, and landscaping from damage or soiling from reroofing operations.
- F. Maintain access to existing walkways, corridors, and other adjacent occupied or used facilities.
- G. Limit construction loads on roof for roofing equipment loads and for uniformly distributed loads.
- H. Weather Limitations: Proceed with installation only when existing and forecasted weather conditions permit assembly of metal panels to be performed according to manufacturers' written instructions and warranty requirements.
 - 1. Remove only as much roofing in one day as can be made watertight in the same day.
 - 2. Protect existing 'blown' insulation on ceiling.
- I. Hazardous Materials: It is not expected that hazardous materials, such as asbestos or lead containing materials, will be encountered in the Work.
 - 1. If materials suspected or containing hazardous materials are encountered, do not disturb; immediately notify Architect and Owner's Representative.

1.7 SAFETY

- A. Contractor shall exercise proper precautions when conducting work. The Contractor is responsible for enforcing the safety of his/her employees, subcontractors, and vendors, and complying with any safety regulations.
- B. Contractor shall follow all safety rules set forth by OSHA, State of Texas,
- C. All standard safety precautions shall be performed by the Contractor, including the use of proper Personal Protection Equipment (PPE).

1.8 COORDINATION

- A. Coordinate sizes and locations of any equipment tether/supports and roof penetrations with actual equipment provided.
- B. Coordinate metal panel installation with flashing, trim, soffits, and other work to provide a leakproof, secure, and noncorrosive installation.

1.9 WARRANTIES

- A. Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace components of metal panel systems that fail in materials or workmanship within specified warranty period.
 - 1. Failures include, but are not limited to, the following:
 - a. Structural failures including rupturing, cracking, or puncturing.
 - b. Deterioration of metals and other materials beyond normal weathering.
 - 2. Warranty Period: Two (2) years from date of Substantial Completion.
- B. Special Warranty on Panel Finishes: Manufacturer's standard form in which manufacturer agrees to repair finish or replace metal panels and gutters/downspouts that show evidence of deterioration of factory-applied finishes within specified warranty period.
 - 1. Exposed Panel Finish: Deterioration includes, but is not limited to, the following:
 - a. Color fading more than 5 Hunter units when tested according to ASTM D2244.
 - b. Chalking not to exceed No. 8 rating when tested according to ASTM D4214.
 - c. Cracking, checking, peeling, or failure of paint to adhere to bare metal.
 - 2. Finish Warranty Period: Twenty (20) years from date of Substantial Completion.
- C. Special Weathertightness Warranty: Manufacturer's standard form in which manufacturer agrees to repair or replace standing-seam metal roof panel assemblies that fail to remain weathertight, including leaks, within specified warranty period.
 - 1. Warranty Period: Twenty (20) years from date of Substantial Completion.
 - 2. Warranty to have no exclusions for wind speed damage for winds up to 120 mph.

1.10 CLOSEOUT SUBMITTALS

- A. Maintenance Data: For metal panels to include in maintenance manuals.
- B. Standard and Special Warranties: Provide two (2) executed copies of each warranty to the Owner, with start from date of Substantial Completion.

PART 2 - PRODUCTS

2.1 PERFORMANCE REQUIREMENTS OF STANDING-SEAM METAL ROOF SYSTEM

- A. Solar Reflectance Index: Not less than 60 when calculated according to ASTM E 1980.
- B. Structural Performance: Provide metal panel systems capable of withstanding the effects of the loads and stresses based on testing according to ASTM E1592 "Test Method for Structural Performance of Sheet Metal Roof by Uniform Static Air Pressure Difference:
 - 1. Wind Loads: FM Global I-90.
 - 2. Deflection Limits: For wind loads, no greater than 1/240 of the span.
- C. Air Infiltration: Air leakage of not more than 0.09 cfm/sq. ft. when tested according to ASTM E1680 at the following test-pressure difference:
 - 1. Test-Pressure Difference: 6.24 lbf/sq. ft., equivalent to a 50-mph wind.
- D. Water Penetration under Static Pressure: No water penetration when tested according to ASTM E1646 at the following test-pressure difference:
 - 1. Test-Pressure Difference: 12 lbf/sq. ft., equivalent to a 50-mph wind.
- E. Hydrostatic-Head Resistance: No water penetration when tested according to ASTM E2140.
- F. Wind-Uplift Resistance: Provide metal roof panel assemblies that comply with UL 90, 449, and 580 ratings, based on 16-inch width panels, 24 gauge, on Open Framing for wind-uplift-resistance class.
 - 1. Uplift Rating: UL 90.
- G. FM Global Listing: Provide metal roof panels and component materials that comply with requirements in FM Global 4471 as part of a panel roofing system and that are listed in FM Global "Approval Guide" for Class 1 or noncombustible construction, as applicable. Identify materials with FM Global markings.
 - 1. Fire/Windstorm Classification: Class 1A 90.
 - 2. Hail Resistance: Severe Hail (SH).
- H. Thermal Movements: Allow for thermal movements from ambient and surface temperature changes by preventing buckling, opening of joints, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Allow for deflection and design for thermal stresses caused by temperature differences from one side of the panel to the other. Base calculations on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

1. Temperature Change (Range): 120 degrees F, ambient; 180 degrees F, material surfaces.

2.2 STANDING-SEAM METAL ROOF PANELS

- A. Provide factory-formed metal roof panels designed to be installed by lapping and interconnecting raised side edges of adjacent panels with joint type and mechanically attaching panels to supports using concealed clips within side laps. Include concealed clips and fasteners, and accessories required for weathertight installation.
 1. Steel Panel Systems: Unless more stringent requirements are indicated, comply with ASTM E1514, Standard Specification for Structural Standing Seam Steel Roof Panel Systems.
- B. Source Limitations: Obtain metal roof panel assembly and accessories from a single source with resources to provide fixed base roll forming, and accredited under IAS AC 472 Part B, Accreditation Criteria for Inspection Programs for Manufacturers of Metal Building Systems.
- C. Vertical-Rib, Standing-Seam Metal Roof Panels: Formed with vertical ribs at panel edges and Striations (intermediate stiffening ribs) symmetrically spaced between ribs; designed for sequential installation by mechanically attaching panels to supports using concealed clips located under one side of panels, engaging opposite edge of adjacent panels, and locking/snapping panels together.
 1. Product: Subject to compliance with requirements, provide **MBCI SuperLok, Structural Galvalume SSR**, or Comparable Product by one of the following:
 - a. AEP Span: a BlueScope Steel company.
 - b. Architectural Building Components: McElroy Metal, Inc.
 - c. Architectural Metal Systems; a Nucor company.
 - d. Garland Company, Inc. (The)
 - e. IMETCO.
 - f. MBCI; a division of NCI Building Systems, L.P.
 - g. Merchant & Evans.
 - h. Metal-Fab Manufacturing Corporation.
 - i. Morin; a Kingspan Group company.
 - j. Ultra-Seam, Inc.
 - k. Union Corrugating Company.
 2. **MBCI SuperLok, Structural Galvalume SSR** is “a structural roofing panel, can be installed directly over purlins, does not require a solid substructure for support.”
 3. Metallic-Coated Steel Sheet: **Aluminum-zinc Alloy-Coated (galvanized Galvalume) Steel Sheet, structural quality**, complying with ASTM A792/A792M, Class AZ50 coating designation; pre-painted by the coil-coating process to comply with ASTM A755/A755M.
 - a. Nominal Thickness: **24-gauge**
 - b. Exterior Finish: Exposed Galvalume Plus Coating.
 - c. Concealed Finish: Exposed Galvalume Plus Coating.

- d. Coating: manufacturer's acrylic or polyester backer finish consisting of prime coat and wash coat with a minimum total dry film thickness of 0.5 mil.
- 4. Concealed Anchor Clips: One-piece fixed and Two-piece Low-floating system with 3/8-inch spacer to accommodate thermal movement, configured for concealment within panel joints, made by same roof panel manufacturer. Spaced not more than 4-feet apart on the open framing. Align fasteners for clips with trusses below purlins.
- 5. Panel Coverage Width: 16-inches.
- 6. Panel Height: 2- inches.
- 7. Profile: with Striations (intermediate stiffening ribs).
- 8. Joint Type: Double-folded, standard with manufacturer.

2.3 UNDERLAYMENT MATERIALS

- A. All underlayment materials shall be approved by roofing panel manufacturer.
- B. High-Temperature Underlayment: Provide moisture barrier/ vapor retarder: 30# organic felt sheet underlayment, type resistive to wrinkling. To be used in roof areas that are above enclosed and conditioned rooms.
 - 1. Thermal Stability: Stable after testing at 240 deg F; ASTM D1970.
 - 2. Low-Temperature Flexibility: Passes testing at minus 20 deg F; ASTM D1970.

2.4 ACCESSORIES

- A. Panel Accessories: Provide components required for a complete, weathertight panel system including trim, copings, fascia, concealed clips, thermal spacer concealed clips, flashings, sealants, gaskets, fillers, closure strips, and similar items. Match material and finish of metal panels unless otherwise indicated.
 - 1. Closures: Provide closures at eaves and ridges, fabricated of same metal as metal panels.
 - 2. Backing Plates: Provide metal backing plates at panel end splices, fabricated from material recommended by manufacturer.
- B. Pipe Penetration Flashings: 20-year warranted flexible boot type, with compression ring.
- C. Flashing and Trim: Provide flashing and trim formed from same material as metal panels as required to seal against weather and to provide finished appearance. Locations include, but are not limited to, eaves, corners, bases, ridges, fasciae, and fillers.
- D. Panel Fasteners: Self-tapping screws designed to withstand design loads, recommended by roof panel manufacturer. See manufacturer's product manual for exact fastener(s) specifications.
- E. Panel Sealants: Panels should have standard factory applied mastic inside of female leg of panel. Provide sealant for mechanically seaming the panels. Provide sealant

type recommended by manufacturer compatible with panel materials, are non-staining, and do not damage panel finish. All panels require end sealant at eave and valley conditions.

1. Sealant Tape: Pressure-sensitive, 100 percent solids, gray polyisobutylene compound sealant tape with release-paper backing. Provide permanently elastic, non-sag, nontoxic, non-staining tape 1/2 inch-wide and 1/8 inch thick.
 2. Joint Sealant: ASTM C920; elastomeric polyurethane or silicone sealant; of type, grade, class, and use classifications required to seal joints in metal panels and remain weathertight; and as recommended in writing by metal panel manufacturer.
 3. Butyl-Rubber-Based, Solvent-Release Sealant: ASTM C1311
- F. Gutters: Formed from same material as roof metal panels, complete with end pieces, outlet tubes, and other special pieces as required. Provide 5½-inch **Seamless** fabricated box gutters. Furnish gutter supports spaced a maximum of 36 inches o. c., fabricated from same metal as gutters, 5½-inches minimum depth and width. Gutters should be pre-finished powder-coated to match dark brown paint on existing wood fascia trim and columns. Pre-finish dark brown color to match "Status Bronze" #7034 by Sherwin-Williams. Provide metal color samples for Owner and Architect's selection.
- G. Downspouts: Formed from same material as roof metal panels. Fabricate from 10-foot long sections, complete with formed elbows and offsets. Pre-finished downspouts to match gutters.
- H. Splash Pans: Install where downspouts discharge from roof. Splash pans should be 24-inches minimum in length. Color to match gutters and downspouts' color.
- I. Fasteners/anchors to communication tower: Provide Lag Eye-Screws 3/8-inch by 4-1/2-inch minimum, galvanized zinc-plated finish. Fasten directly to wood structure without penetrating metal panels or gutters. Select two obtuse-angle locations for the screws. Pre-drill holes and then attach lag eye-screws. Fasten two tether lines from communication antennae tower to building structure. Re-fasten the communication tower to the side fascia board location as the third connection.

2.5 FABRICATION

- A. Provide factory fabricated and finished metal panels and accessories by manufacturer's standard procedures and processes, as necessary to fulfill indicated performance. Comply with indicated profiles and with dimensional and structural requirements. Provide panel profile, including major ribs and intermediate stiffening striation ribs, for full length of panel
- B. Fabricated metal panel joints shall be configured with factory-applied sealant providing weathertight seal and preventing metal-to-metal contact and minimizing noise resulting from thermal movements.
- C. Sheet Metal Flashing and Trim: Fabricate flashing and trim to comply with manufacturer's recommendations that apply to design, dimensions, metal, and other characteristics:

1. Form exposed sheet metal and accessories without excessive oil canning, buckling, and tool marks and that are true to line and levels, with exposed edges folded back to form hems.
2. Dimension of drip edge for flashings should project 1-inch and cover the vertical face of the 1x4 wood purlins and the vertical face of the fascia boards by 4 inches minimum for moisture protection.
3. Sealed Joints: Form non-expansion, but movable, joints in metal to accommodate sealant and to comply with manufacturer's standards.
4. Conceal fasteners and expansion provisions. Exposed fasteners are not allowed on faces of accessories exposed to view.
5. Fabricate cleats and attachment devices from same material and thickness as accessory being anchored or from compatible, noncorrosive metal recommended by metal panel manufacturer.

2.6 FINISHES

- A. Protect mechanically applied and painted finishes on exposed surfaces from damage by applying strippable temporary protective coverings before shipping.
- B. Appearance of Finished Work: Noticeable variations in same piece are unacceptable. Variations in appearance of other components are acceptable if they are within the range of approved samples and are assembled or installed to minimize contrast.

PART 3 - EXECUTION

3.1 PREPARATION

- A. During removal operations have enough suitable materials on-site to facilitate rapid installation of temporary protection in the event of unexpected rain or inclement weather.
- B. Miscellaneous Supports: Install sub-framing, and other miscellaneous panel support members and anchorages according to metal panel manufacturer's written recommendations.

3.2 EXAMINATION

- A. Examine 30-pound felt underlayment and conditions for compliance with requirements for installation tolerances, supports of metal panels, and other conditions affecting performance of the Work.
 1. Examine primary and secondary roof framing to verify that rafters, purlins, and other structural panel support members and anchorages are within alignment tolerances required by metal roof panel manufacturer.

- B. Examine roughing-in for components and systems penetrating metal panels to verify actual locations of penetrations relative to seam locations of metal panels before installation.
- C. Replace rotted or damaged wood, purlins, fascia and/or trim where necessary. New Exterior Wood Trim: should be wood with maximum moisture content of 15 percent. Install exterior face 'bark' side out. Install trim with minimum number of joints as is practical, using full-length pieces from maximum lengths of lumber available. Do not use pieces less than 24 inches long, except where necessary.
- D. Metal Protection: Where dissimilar metals contact each other or with corrosive substrates (i.e. copper, lead, graphite, treated lumber, mortar, etc.), protect from water run-off from these materials, protect against galvanic action as recommended by metal panel manufacturer.
- E. Discrepancies: In event of discrepancy, notify the Owner and Architect.
- F. Proceed with installation only after unsatisfactory conditions have been corrected.

3.3 UNDERLAYMENT INSTALLATION

- A. 30-pound Felt Sheet Underlayment: Apply at locations, wrinkle free, in shingle fashion to shed water, and with end laps of not less than 6 inches staggered 24 inches between courses. Overlap side edges not less than 4-inches. Apply over the roof surface area that has conditioned spaces below. Do not apply exposed over porches or eaves.
 - 1. For roof slopes from 2:12 up to 4:12 per IBC code, underlayment shall be two layers applied as follows: Apply a 19-inch strip of underlayment felt parallel to and starting at the eaves. Starting at the eave, apply 36-inch wide sheets of underlayment, overlapping successive sheets 19 inches. End laps shall be 4-inches and shall be offset by 6-feet. (Over conditioned spaces).
 - 2. For roof slopes greater than 4:12 or greater (steeper), per IBC code: Underlayment shall be applied shingle fashion parallel to and starting from the eave and lapped 4-inches. End laps shall be 4-inches and shall be offset by 6-feet. (Over conditioned spaces).
- B. The 30# felt underlayment, per IBC code, shall be attached with corrosion resistant fasteners in a grid pattern of 12-inches between side laps with a 6-inch spacing at side and end laps. Underlayment shall be attached using metal or plastic cap nails or cap staples with a nominal cap diameter of not less than 1-inch. Minimum thickness of the outside edge of plastic caps shall be 0.035-inch. The cap nail shank shall be not less than 0.063-inch for ring shank cap nails and 0.091-inch for smooth shank cap nails. Staples shall be not less than 21-gauge. The cap nail shank and cap staple legs shall have a length sufficient to penetrate through the roof sheathing or not less than $\frac{3}{4}$ -inch into the roof sheathing.
- C. Flashings: Install flashings to cover underlayment and as recommended by manufacturer.

3.4 INSTALLATION OF STANDING SEAM METAL ROOF PANELS

- A. Install mechanically seamed structural standing seam metal panel system according to manufacturer's instructions in orientation, sizes, and locations. Anchor metal panels and other components of the Work securely in place, with provisions for thermal and structural movement.
1. Shim or otherwise plumb substrates receiving metal panels.
 2. Flash and seal metal panels at perimeter of all openings. Fasten with self-tapping screws. Do not begin installation until air- or water-resistive barriers and flashings that will be concealed by metal panels are installed.
 3. Install screw fasteners in predrilled holes, 2 per concealed clip, to meet uplift UL tested requirements.
 4. Locate and space fastenings in uniform vertical and horizontal alignment.
 5. Provide uniform, neat seams.
 6. Install flashing and trim as metal panel work proceeds.
 7. Install full metal panels from roof's top ridge line down to the eaves.
 8. Install flashings and other accessories as required in the transitional change of roof slopes.
 9. Locate panel splices over, but not attached to, structural supports. Stagger panel splices and end laps to avoid a four-panel lap splice condition.
 10. Align bottoms of metal panels and fasten with blind rivets, bolts, or self-tapping screws. Fasten flashings and trim around openings and similar elements with self-tapping screws.
 11. Avoid restricting the thermal expansion and contraction of the metal panels, i.e. do not attach panels to the substructure at both the eave and ridge.
 12. Provide weathertight escutcheons for pipe- and conduit-penetrating panels.
- B. Flashings: including laps, splices, joints, bonding, adhesion, and attachment, as required by roof panel manufacturer's recommendations. Install flashing at chimney walls and other vertical and sloped surfaces. Install metal trim, accessories, and edgings. Install with laps, joints, and seams that will be permanently watertight and weather resistant.
1. Install exposed flashing and trim that is without buckling and tool marks, and that is true to line and levels indicated, with exposed edges folded back to form hems. Install metal flashing and trim to fit substrates and achieve waterproof and weather-resistant performance.
- C. Concealed Anchor Clips: Anchor metal roof panels and other components of the Work securely in place, using manufacturer's approved fasteners according to manufacturers' instructions. Concealed anchor clips should not be spaced greater than 4 feet apart. To comply with UL design criteria, two fasteners (self-tapping screws specified by manufacturer) should be fastened to each anchor clip. Location of fastener screws should be anchored to the roof framing through the purlins and into the trusses.
- D. Structural Standing-Seam Metal Roof Panel Installation: Fasten metal roof panels to supports with concealed clips at each standing-seam joint at location, spacing, and with fasteners recommended by manufacturer.

1. Mechanically-Seamed-Joints: Crimp standing seams with manufacturer-approved, motorized seamer tool so clip, metal roof panel, and factory-applied sealant are completely engaged.
 2. Watertight Installation:
 - a. Apply a continuous ribbon of sealant or tape to seal joints of metal panels, using sealant or tape as recommend by manufacturer as needed to make panels watertight.
 - b. Provide sealant or tape between panels and protruding equipment, vents, and accessories.
 - c. At panel splices, nest panels with minimum 6-inch end lap, sealed with sealant and fastened together by interlocking clamping plates.
 - d. Field cutting of the panels should be avoided where possible. If field cutting is required, the panels must be cut with nibblers, snips, or shears to prevent edge rusting. Do not cut the panels with abrasive saw blades, grinders or torches.
- E. Transition of roof slopes: After applying the underlayment and sub-flashing, the lower roof metal panels must be installed prior to installation of the transition. For transition, field cut Z-closures to fit between panel ribs. Add sealant tape at Z-closure bottom, at ends/panel ribs and lapping closure tabs to seal all voids. Attach the Z-closure to the metal panels (and to the purlins/blocking below) with self-drilling screws with washers on tape sealer, 4 per 16-inch panel at 3-inches on center, at a row 4-inches below from transition line. Apply sealant to ends of Z-closure to adjacent panel legs. Install the slope transition flashing made of the same material and finish as the metal panels. The sloped transition flashing should have a hem break to overlap and hook the Z-closure upper ends. It should not have a slope less than 1:12. Apply sealant to the gable trim to seal the sloped transition panel. Install tape sealant to the underside of the offset cleat trim. Fasten the offset cleat trim to the upper portion of the transition flashing, using pancake head self-tapper fasteners, 12-inches on center maximum spacing. Install the upper roof metal panels with a ½-inch minimum hem at the front edge to hook over the offset cleat trim. Attach concealed clips for upper metal panels 12-inches maximum distance from hem. Refer to manufacturer's recommended details for flashings, sealants, sealant tapes, fasteners, and clips at roof slope transitions.
- F. Accessory Installation: Install accessories with positive anchorage to building and weathertight mounting and provide for thermal expansion. Coordinate installation with flashings and other components.
1. Install components required for a complete metal panel system including trim, copings, corners, seam covers, flashings, sealants, gaskets, fillers, and similar items. Provide types recommended by metal roof panel manufacturer.
- G. Gutters: Should be seamless gutters without joints. Attach gutters to eaves with gutter hangers spaced not more than 36 inches o. c. using manufacturer's standard fasteners. Provide end closures and seal watertight with sealant. Provide for thermal expansion.
- H. Downspouts: Join sections with telescoping joints. Provide fasteners designed to hold downspouts securely; locate fasteners at top and bottom and at approximately 60-inches o. c. in between.
1. Provide elbows at base of downspouts to direct water away from building.
 2. Attach splash pans to drain water away from building.

3.5 ERECTION TOLERANCES

- A. Installation Tolerances: Shim and align metal panel units within installed tolerance of ¼-inch in 20 feet on slope and location lines as indicated and within 1/8-inch offset of adjoining faces and of alignment of matching profiles.

3.6 FIELD QUALITY CONTROL

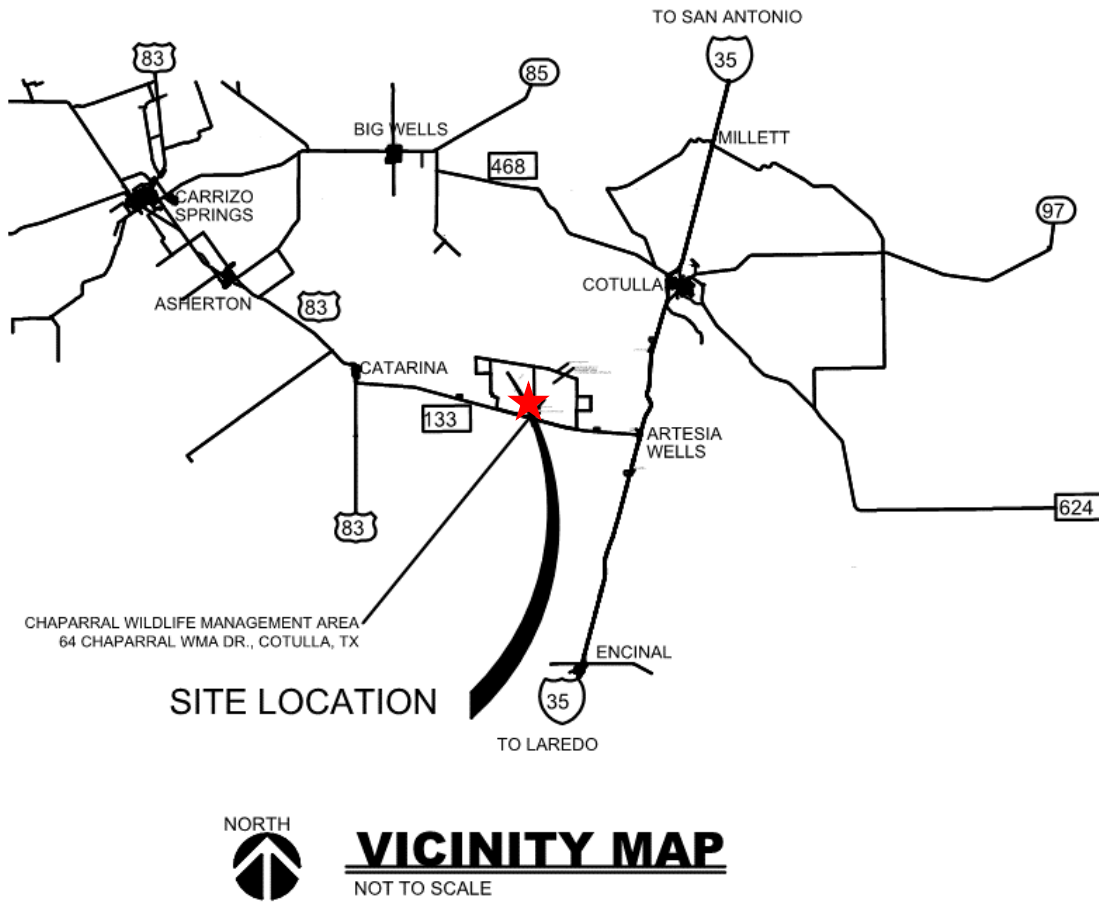
- A. Manufacturer's Field Service: Engage a factory-authorized service representative to test and inspect metal roof panel installation, including accessories. Report results in writing.
- B. Remove and replace applications of metal roof panels where tests and inspections indicate that they do not comply with specified requirements.
- C. Additional tests and inspections, at Contractor's expense, are performed to determine compliance of replaced or additional work with specified requirements.
- D. Prepare test and inspection reports. Include these test and inspection reports within the Action Submittals.

3.7 CLEANING AND PROTECTION

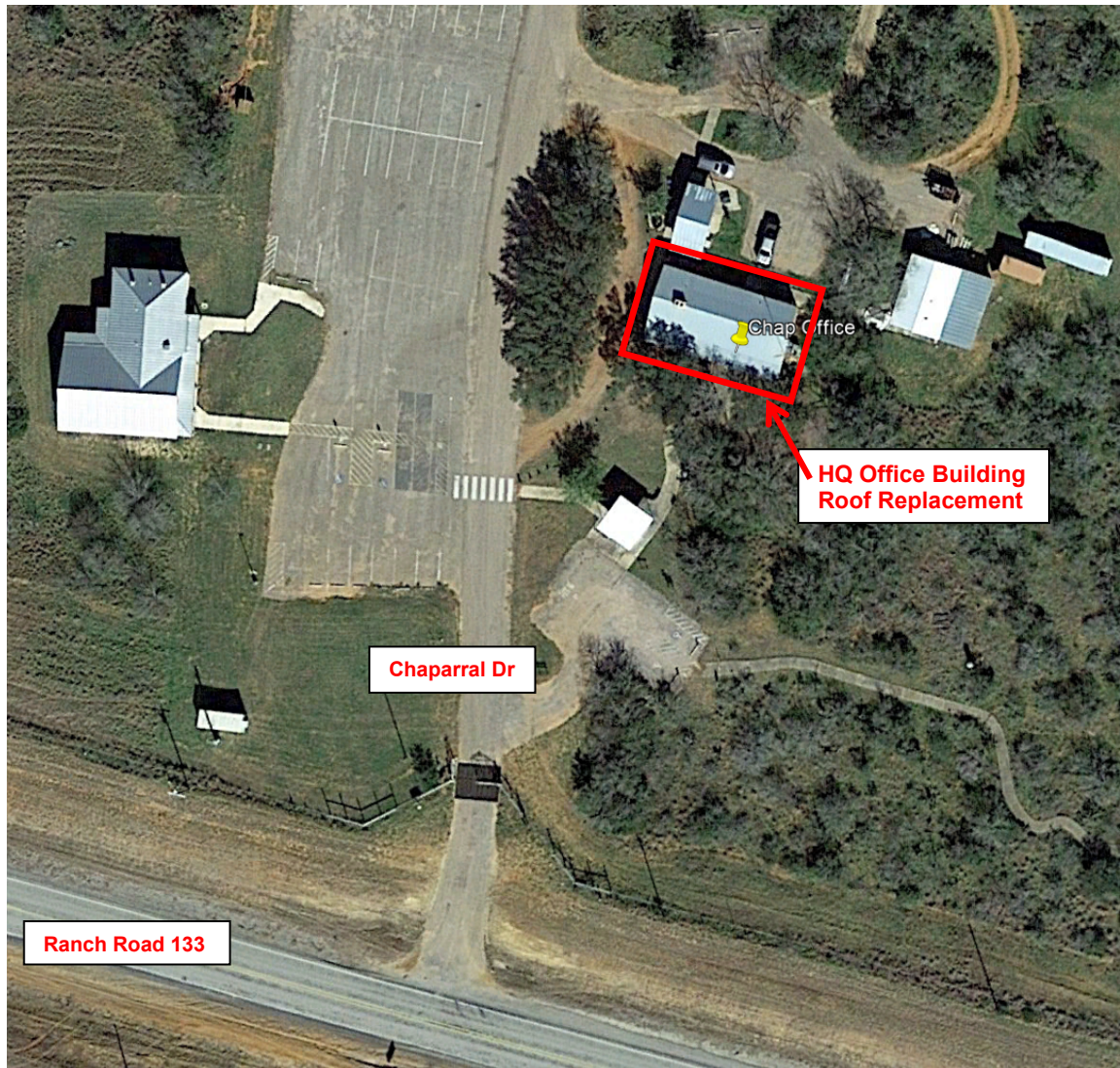
- A. After removal, collect existing corrugated metal panel materials, and coordinate with Owner location for storage.
- B. Collect all other demolished materials and place in containers. Promptly dispose of demolished materials. Do not allow demolished materials to accumulate on site.
- C. Standing seam metal roof panels are not designed to be work platforms. Avoid any unnecessary foot traffic on metal panels.
- D. Remove temporary protective coverings and strippable films, if any, as metal panels are installed, unless otherwise indicated in manufacturer's written installation instructions. On completion of metal panel installation, clean finished surfaces as recommended by metal panel manufacturer. Maintain in a clean condition during construction.
- E. Replace standing seam metal panels that have been damaged or have deteriorated beyond successful repair by finish touchup or similar minor repair procedures.
- F. Clean site. Visually inspect and sweep the surrounding site ground and landscaping with magnet. Remove all trash and errant metals.
- G. Legally dispose of waste off-site. Do not use TPWD trash receptacles for construction waste.

END OF TECHNICAL SPECIFICATION SECTION

Appendix A – Vicinity Location Map



Appendix B – Site Map



Appendix C – Photos of Building

**View from
Northwest**



**View from
Southwest**



**View from
Southeast**

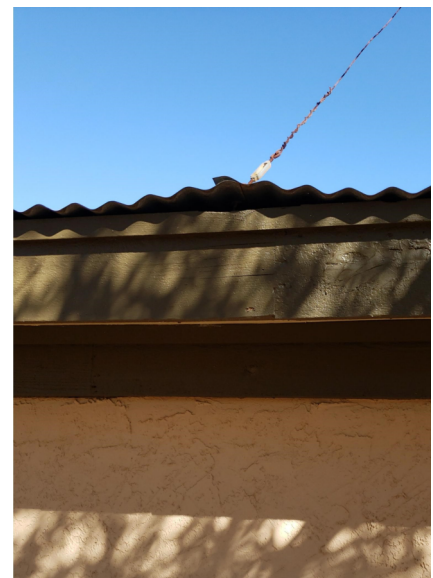
**Note: need to
disconnect
tether to
communication
tower, add
temporary
tether lines
during
construction,
and re-connect
all tether lines,
as part of
scope of work.**



**View of
communications
tower**



View of tether at roof



**Views of soffit/
eave at north
facade**



**View of soffit
and porch
rafters at
south**



**View of soffit/
eave at north
facade**



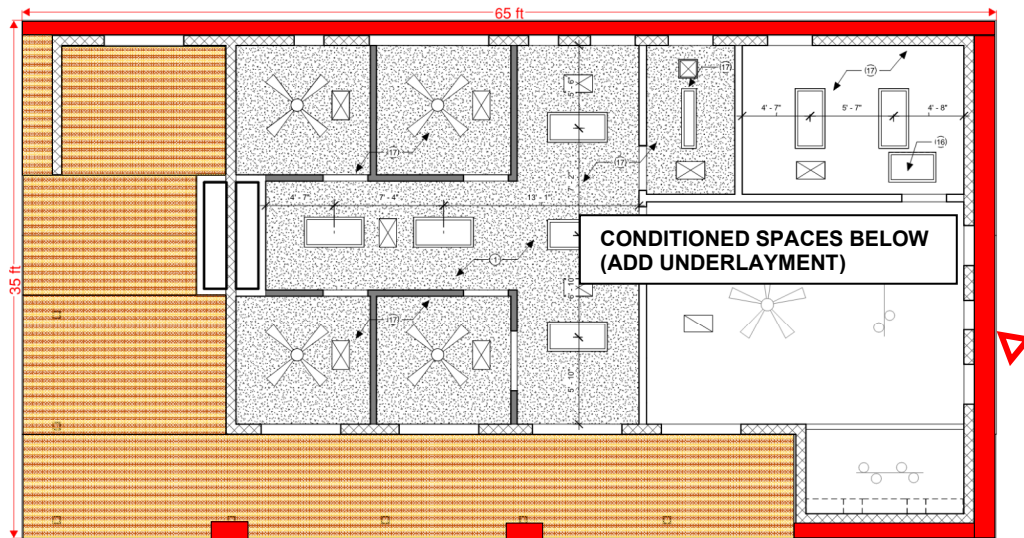
View into Attic



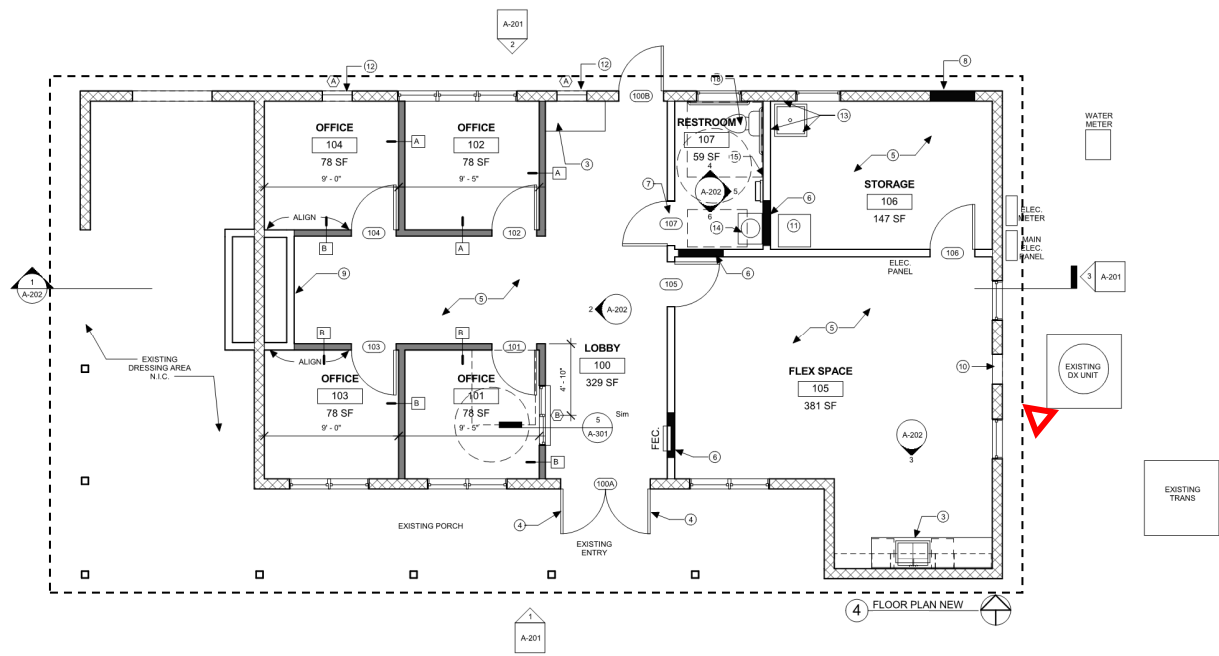
Appendix D – Floor Plan and Reflected Ceiling Plan

(not to scale, field verify all dimensions shown)

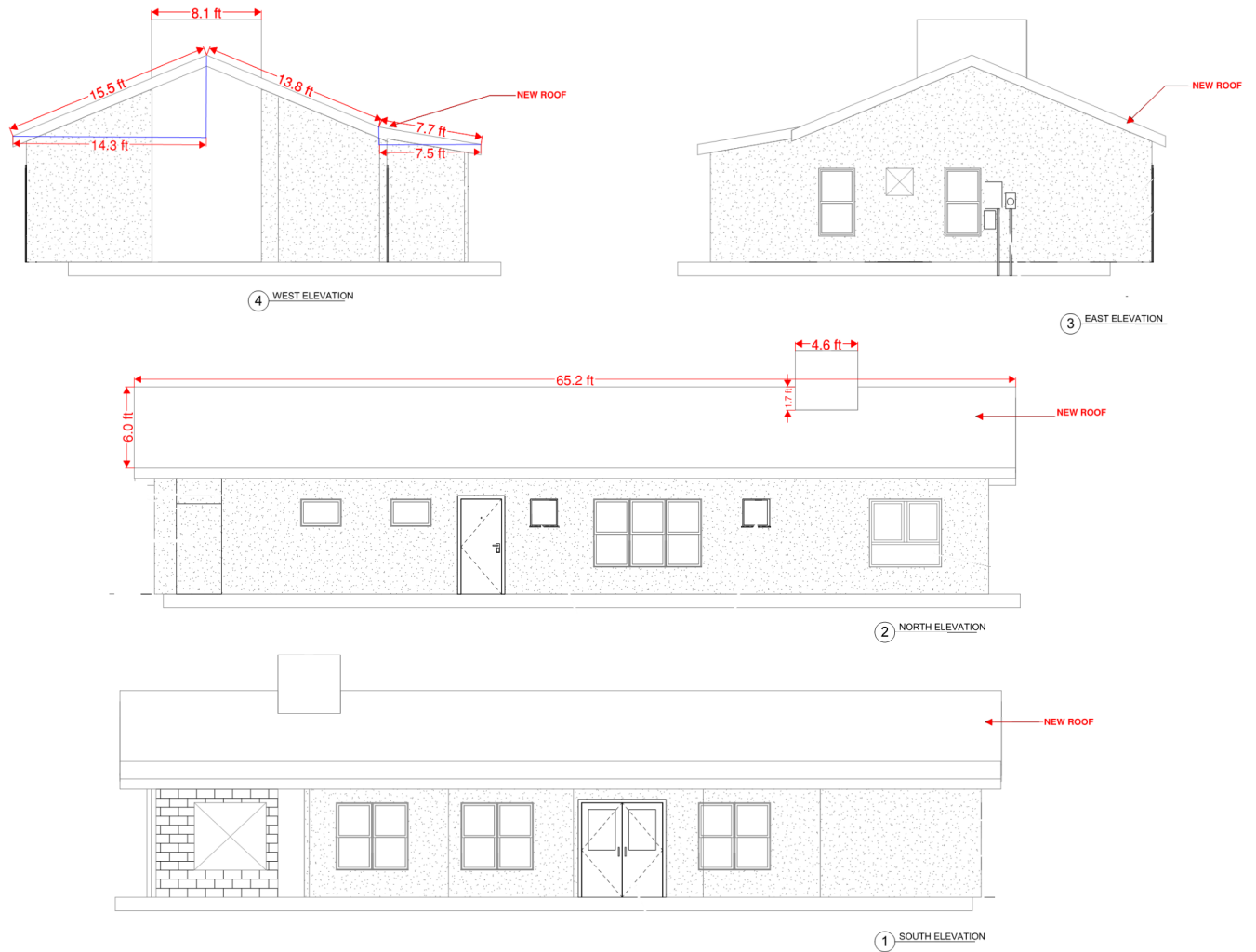
- Existing Soffit
- Exposed Purlins, No Underlayment
- Communications Tower



2 REFLECTED CEILING PLAN - NEW



Appendix E – Elevations *(not to scale, field verify all dimensions shown)*



END OF DOCUMENT